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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A sub-manager (20) for interfacing between ~~a~~an SNMP network management system (22) and a plurality of SNMP managed clients (18), each of such SNMP managed clients (18) being served by a network address translation firewall (16), the sub-manager (20) comprising:

a network management agent (25) for i) receiving a master SNMP network management request message from the SNMP network management system; and ii) providing a master SNMP response message to the SNMP ~~exchanging master network management messages (190) with the network management system (22);~~

a connections module, for each of the plurality of SNMP managed clients: (24) for establishing an internet protocol a network connection (45) with such SNMP managed client through the firewall serving such SNMP managed client; and each of the plurality of clients (18);

both: i) providing, to each of the plurality of SNP managed clients, a client network management request message; and ii) receiving, from each of the plurality of SNMP managed clients, a client response message, in each case, through the internet protocol connection; and

a message handling module (26) for:

receiving the a-master SNMP network management request message (170) from the network management system (22), the master SNMP network management request message (170) including a plurality of master object identifiers (182), each master object identifier (182) comprising a client identifier (46) that identifies a particular one of the SNMP managed clients (18) and a variable portion (240) that identifies a variable value (44) within a client management information base (34);

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generating, for each master object identifier included in the master SNMP network management request message, the ~~at least one~~ client network management request message ~~(172)~~, each client network management request message ~~(172)~~ including a client object identifier ~~(188)~~ that identifies the variable value ~~(44)~~ within the client management information base ~~(34)~~;

~~providing each client network management request message (172) to the particular one of the clients (18) identified by the client identifier (46) over the network connection (45) established with such particular one of the clients (18);~~

receiving ~~the~~ a client response message ~~(206)~~ from each of the particular ~~one of the~~ SNMP managed clients ~~(18)~~ to which a client network management message ~~(172)~~ was provided, each client response message ~~(206)~~ including the client object identifier ~~(188)~~ and the variable value ~~(44)~~;

aggregating each client response message ~~(206)~~ to generate a master SNMP response message ~~(192)~~, the master SNMP response message ~~(192)~~ including the plurality of master object identifiers ~~(182)~~ and each master object identifier ~~(182)~~ comprising the client identifier ~~(46)~~ and the variable value received in the client response message. ~~(206)~~; and

~~providing the master response message (192) to the network management system (22).~~

2. (Currently Amended) The sub-manager ~~(20)~~ of claim 1, wherein the variable portion ~~(210)~~ of the master object identifier ~~(182)~~ is the client object identifier ~~(188)~~.

3. (Currently Amended) The sub-manager ~~(20)~~ of claim 1, wherein:

each internet protocol connection ~~(45)~~ is a TCP/IP connection that is established with a SNMP managed client ~~(18)~~, through the firewall ~~(16)~~ serving such SNMP managed client ~~(18)~~ in response to receiving a connection request initiating by such SNMP managed client ~~(18)~~;

the connections module ~~(24)~~ further records, in an active connections table ~~(28)~~, for each internet protocol connection ~~(45)~~, a client connection identifier ~~(48)~~ in

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association with the client identifier-(46) identifying the SNMP managed client-(18) that initiated the internet protocol connection-(45); and

a device state machine provides the client network management request message-(172) to the particular one of the SNMP managed clients-(18) by providing the client network management request-(172) over the internet protocol connection-(45) that associates with the particular one of the SNMP managed clients-(18) in the active connections table-(28).

4. (Currently Amended) The sub-manager-(20) of claim 3, wherein the client connection identifier-(48) is a source IP address-(50) and a source port number (52) obtained from a TCP/IP frame initiated by the SNMP managed client-(18) with which the internet protocol connection-(45) is established.

5. (Currently Amended) The sub-manager-(20) of claim 1 wherein the device state machine further provides for:

periodically receiving a heart beat message-(113) from the SNMP managed client-(18) over the internet protocol connection-(45); each heart beat message (113) including the client identifier-(46) and a time interval-(114) between the heart beat message-(113) and a subsequent heart beat message-(113);

updating the client connection identifier-(48) in the active connection table (28) if the source IP address-(50) or the source port number (52)-obtained from the heart beat message-(113) differs from that of a previous heart beat message-(113);

providing a heart beat acknowledgement message-(112) to the SNMP managed client-(18) over the internet protocol connection-(45); and

determining that the internet protocol connection-(45) is inactive if a time period in excess of the time interval-(114) elapses during which a subsequent heart beat message-(113) has not been received.

6. (Currently Amended) The sub-manager-(20) of claim 5, wherein the master SNMP response message-(192) includes an indication that the a value-(44) does

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not exist if the value ~~(44)~~ is associated with a master object identifier ~~(182)~~ that includes a client identifier ~~(46)~~ associated with a an SNMP managed client ~~(18)~~ with which the internet protocol connection ~~(45)~~ is inactive.

7. (Currently Amended) The sub-manager ~~(20)~~ of claim 1, wherein:
the master SNMP network management request message ~~(172)~~ comprises at least two master object identifiers ~~(182)~~, each master object identifier ~~(182)~~ comprising a client identifier ~~(46)~~ that is unique from the client identifier ~~(46)~~ of at least one other master object identifier ~~(182)~~;
8. (Currently Amended) The sub-manager ~~(20)~~ of claim 1, wherein the message handling module ~~26~~ further provides for:
receiving an asynchronous client Trap message ~~(220)~~ initiated by SNMP managed client ~~(18)~~ over the internet protocol connection ~~(45)~~ established with the SNMP managed client ~~(18)~~, the asynchronous client Trap message ~~(220)~~ including a client object identifier ~~(188)~~ and a variable value ~~(44)~~ associated with the client object identifier ~~(188)~~;
identifying the SNMP managed client ~~(18)~~ that initiated the asynchronous client Trap message ~~(220)~~; and
generating an asynchronous master Trap message ~~(194)~~ and providing the asynchronous master Trap message ~~(194)~~ to the SNMP network management system ~~(22)~~, the asynchronous master Trap message ~~(194)~~ including the value ~~(44)~~ and a master object identifier ~~(182)~~, the master object identifier ~~(182)~~ including a client identifier ~~(46)~~ identifying the SNMP managed client ~~(18)~~ that initiated the asynchronous client Trap message ~~(22)~~ and a variable portion ~~(210)~~ identifying the variable value ~~(44)~~.
9. (Currently Amended) The sub-manager ~~(20)~~ of claim 8, wherein the variable portion ~~(210)~~ of the master object identifier ~~(182)~~ is the client object identifier ~~(188)~~.

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10. (Currently Amended) A method of interfacing between ~~a~~an SNMP network management system-(22) and a plurality of SNMP managed clients-(18), each of such SNMP managed clients-(18) being served by a firewall-(16), the method comprising:

establishing ~~a~~an internet protocol connection-(45) with each of the plurality of SNMP managed clients-(18);

receiving a master SNMP network management request message-(170) from the SNMP network management system-(22), the master SNMP network management request message-(170) including a plurality of master object identifiers-(182), each master object identifier-(182) comprising a client identifier (46) that identifies a particular one of the SNMP managed clients-(18) and a variable portion-(210) that associates with a variable value-(44) within a client management information base-(34);

generating, for each master object identifier included in the master SNMP network management request message, ~~a~~ at least one client network management request message-(172), the client network management request message-(172) including a client object identifier-(188) that identifies the variable value-(44) within the client management information base-(34);

providing each client network management request message-(172) to the particular one of the SNMP managed clients-(18) identified by the client identifier (46) over the ~~network~~internet protocol connection-(45) established with such particular one of the SNMP managed clients-(18);

receiving, ~~from each SNMP managed client~~, a client response message (206) ~~from each of the particular one of the clients (18) to which a client network management message (172) was provided~~, each client response message-(206) including the client object identifier-(188) and the variable-(44);

aggregating each client response message-(206) to generate ~~a~~ master SNMP response message-(192), the master SNMP response message-(192) including the plurality of master object identifiers-(182) and each master object identifier-(182) comprising the client identifier-(46) and the variable value-(44)

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received in the client response message; and

providing the master SNMP response message to the SNMP network management system-(22).

11. (Currently Amended) The method of claim 10, wherein the variable portion (210) of the master object identifier-(182) is the client object identifier-(188).

12. (Currently Amended) The method of claim 10, wherein:

each Internet protocol connection-(45) is a TCP/IP connection established with a an SNMP Managed client-(18), through the firewall-(16) serving such SNMP managed client-(18), in response to receiving a connection request initiating by such SNMP managed client-(18);

the method further comprises recording in an active connections table-(28), for each internet protocol connection-(45) established, a client connection identifier (48) in association with the client identifier-(46) identifying the SNMP managed client-(18) that initiated the internet protocol connection-(45); and

the step of providing each client network management request message (172) to the particular one of the SNMP managed clients-(18) comprises providing each client network management request-(172) over the internet protocol connection-(45) that associates with the particular one of the SNMP managed clients-(18) in the active connections table-(28).

13. (Currently Amended) The method of claim 12, wherein the client connection identifier-(48) is a source IP address-(50) and a source port number-(52) obtained from a TCP/IP frame initiated by the SNMP managed client-(18) with which the internet protocol connection-(45) is established.

14. (Currently Amended) The method of claim 10 further comprising:

periodically receiving a heart beat message-(113) from the SNMP managed client-(18) over the internet protocol connection-(45); each heart beat message

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(113) including the client identifier (46) and a time interval (114) between the heart beat message (113) and a subsequent heart beat message (113);

updating the client connection identifier (48) in the active connection table (28) if the source IP address (50) or the source port number (52) obtained from the heart beat message (113) differs from that of a previous heart beat message (113);

providing a heart beat acknowledgement message (112) to the SNMP managed client (18) over the internet protocol connection (45); and

determining that the internet protocol connection (45) is inactive if a time period in excess of the time interval (114) elapses during which a subsequent heart beat message (113) has not been received.

15. (Currently Amended) The method of claim 14, wherein the master SNMP response message (192) includes an indication that the value (44) is unavailable if an open internet protocol connection (45) does not exist with the particular one of the SNMP managed clients (18).

16. (Currently Amended) The method sub-manager (20) of claim 10, wherein: the master SNMP network management request message (172) comprises at least two master object identifiers (182), each master object identifier (182) comprising a client identifier (46) that is unique from the client identifier (46) of at least one other master object identifier (182);

17. (Currently Amended) The method of claim 10, further comprising: receiving an asynchronous client Trap message (220) from a SNMP managed client (18) over the internet protocol connection (45) established with the SNMP managed client (18), the asynchronous client Trap message (220) including a client object identifier (188) and a variable value (44) associated with the client object identifier (188);

identifying the SNMP managed client (18) that initiated the asynchronous client Trap message (220);

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generating an asynchronous master Trap message-~~(194)~~ and providing the asynchronous master Trap message-~~(194)~~ to the SNMP network management system-~~(22)~~, the asynchronous master Trap message-~~(194)~~ including the variable value-~~(44)~~ and a master object identifier-~~(182)~~, the master object identifier-~~(182)~~ including a client identifier-~~(46)~~ identifying the SNMP managed client ~~(18)~~ that initiated the asynchronous client Trap message-~~(22)~~ and a variable portion ~~(210)~~ identifying the variable value-~~(44)~~.

18. (Currently Amended) the method of claim 17, wherein the variable portion ~~(210)~~ of the master object identifier-~~(182)~~ is the client object identifier-~~(188)~~.